**Theory of probability and random graphs – HW3**

**Q1. Solution**

By Markov Inequality:

Then we have:

is a convex function it follows

We can get:

Thus,

the rest will be easy

**Q2. Solution**

* **Algorithm**: For any , choose with following probability:

* **Performance Analysis**:

For any is the th entry of . By union bound, it suffices to prove for each .

Fix . W.l.o.g, assume iff for some . Then

Note that ’s are independent over with .

By Hoeffding’s Inequality,

By Union Bound,